

UNITED STATES OF AMERICA

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, JACOB R. TAMMINGA, R.R. #2, Orton,  
Ontario, Canada, L0N 1N0, Canadian Citizen, have invented certain new and useful  
improvements in

DOOR FOR A VERTICAL MIXER, of which the following is a  
specification:-

## BACKGROUND OF THE INVENTION

### FIELD OF INVENTION

This invention claims priority based on US Provisional Application Serial Number 60/396,565 filed July 18, 2002 and incorporates all of said  
5 provisional application by reference. This invention relates to a door for a vertical mixer, the mixer having a mixing chamber with a vertical auger rotatably mounted therein. More particularly, the mixing chamber has a door and the door includes part of the floor of the mixing chamber when the door is in a closed position.

### 10 DESCRIPTION OF THE PRIOR ART

Vertical feed mixers of various forms are known and, in particular, vertical feed mixers for mixing round bales of hay or haylage of any size, including large and small bales with other animal feed stuffs including corn, silage, commodities, by-products and concentrates are known. Previous  
15 vertical feed mixers have a mixing chamber with a vertically mounted auger having a helically shaped expanding periphery that is narrowest at a top and increases in size towards a base. The mixing chamber has a door in a side wall thereof. The door has a closed position and an open position and is used to allow feed that has been mixed to exit the mixer. With previous  
20 mixers, when the mixing process has been completed, the door is moved to the open position and a large portion of the feed that has been mixed exits from the mixing chamber through the door. Usually, the mixing chamber is not completely emptied and a sizeable portion of the feed remains within the mixing chamber. The feed must either be removed manually by an operator  
25 of the mixer or remains in the mixer where it is ultimately wasted or becomes mixed in with more feed that is subsequently mixed within the mixer. When different types of feed are mixed in different batches, it is not desirable to have a sizeable amount of feed remaining in the mixer as that feed might contaminate a subsequent batch. The feed remaining in the mixer  
30 reduces the efficiency of the mixer and makes the mixer much more expensive to operate.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a vertical mixer having a mixing chamber with a door that is sized and located so that the mixing chamber is substantially emptied of material that is mixed therein  
5 when the door is opened to allow the mixed material to exit. It is a further object of the present invention to provide a vertical mixer having an auger in a mixing chamber where the auger extends partially beyond the opening during each rotation of the auger when the door is in an open position.

A vertical mixer has a mixing chamber containing a substantially  
10 vertical rotatable auger having a generally helical flight that is tapered to converge from bottom to top. There are power means to rotate the auger about a longitudinal centre axis. The mixing chamber has a floor and a side wall. The side wall has an opening therein that includes part of the floor. The opening is sized and located to be closed by a door, the door having a  
15 closed position and an open position. The door has a segment thereon that forms part of the floor when the door is in the closed position. Preferably, the auger is sized and shaped to extend partially out of the opening during part of each rotation of the auger when the door is in the open position.

### BRIEF DESCRIPTION OF THE DRAWINGS

- Figure 1 is a perspective view of a single auger vertical mixer;  
Figure 2 is a top view of the mixer of Figure 1;  
Figure 3 is a side view of a double auger mixer;  
5 Figure 4 is a top view of the mixer of Figure 3;  
Figure 5 is a partial top view of the mixer of Figure 3 where the door is in an open position and a front portion of the mixer is cut away;  
Figure 6 is a side view of a further embodiment of a mixer with a door in a closed position;  
10 Figure 7 is an enlarged perspective view of the mixer of Figure 1 with the door in an open position;  
Figure 8 is a partial side view of the mixer of Figure 1 with the door in a closed position;  
Figure 9 is a partial side view of the mixer of Figure 1 with the door  
15 in an open position;  
Figure 10 is a partial perspective view of a further embodiment of a mixer having a door in an open position;  
Figure 11 is a partial perspective view of a mixer with the door in a closed position;  
20 Figure 12 is a perspective view of an inside of a door; and  
Figure 13 is a partial perspective view of an inside of a door in an open position.

### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

- In Figures 1 and 2, there is shown a mixer 2 having a single auger 4  
25 with a tapered wall 6 of a mixing chamber 8. The tapered wall 6 converges from top to bottom. The chamber 8 has an open top and an outlet door 10 that is in a closed position. The door 10 is connected to the mixing chamber by hinges 11 and is operable between a closed position and an open position (not shown) by means of a hydraulic cylinder 12. The door can be designed  
30 to be opened and closed in various ways. The door has a segment 13 along a bottom thereof that forms part of a floor 15 of the mixing chamber 8 when

the door is in the closed position. The mixer 2 has a frame 14 with a tongue 16 and wheels 18. There are two sets 19 of wheels 18 mounted on each side of the mixer 2 (only one set 19 being shown in Figure 1) Each set 19 has two wheels 18. Each set 19 is affixed to the mixer by a bracket 21. A conveyer 5 20 is used to move mixed material that exits the door 10 away from the mixer 2. An adjustable baffle 22 located in the wall 6 assists in controlling the degree of cutting that occurs within the mixer. There are two baffles 22 shown in the mixer 2. The tongue 16 has a hitch 13 to connect the mixer to a tractor (not shown). There are two groups 25 of windows 27 extending 10 between a top and bottom of the tapered wall 6.

In Figures 3 and 4, a mixer 24 has two augers 4. A side wall 26 of a mixing chamber 28 is vertical. Bulkheads 30 are located within the chamber 28 between the two augers 4. The bulkheads 30 have sloped surfaces and are located in what would otherwise be dead areas of the chamber 28 to 15 prevent materials that are being mixed from coming to rest in the areas where the bulkheads are located. When material strikes the bulkheads 30, the material slides onto a floor 32 of the mixing chamber 28. The mixer 24 has a drive shaft (not shown) that is sized and located to be connected to the power take-off of a tractor (not shown). Those components of Figures 3 and 20 4 that are the same or similar to the components of Figures 1 and 2 are described using the same reference numerals as used for Figures 1 and 2.

Figure 5 is a partial top view of the mixer 24 with a front portion of the mixing chamber 28 cut away to show a clear view of part 34 of the auger 4 extending out of said opening during part of each rotation of the auger 25 when the door 10 is in an open position. Part 34 is an outer end of a lowermost flight of the auger 4. The same reference numerals are used in Figure 5 to describe those components that are identical to the components of Figures 3 and 4.

In Figure 6, there is shown a further embodiment of a vertical mixer 30 where the mixer has sloped sidewalls 36. Those components of Figure 6 that are the same or similar to components of Figures 3 to 5 are described using

the same reference numerals. A mixer 38 has a mixing chamber 40 with a door 10 in the closed position. A vertical window 42 is located in the sidewall 36. The mixer 38 has two sets 44 of four wheels 18 in each set, there being one set 44 on either side of the mixer. A bracket 46 is affixed to  
5 an underside of the mixing chamber 40. The bracket 46 supports a pivot bar 48. A pivot bracket 50 pivots about the pivot bar 48. Each set 44 of wheels 18 pivots about the pivot bar 48.

In Figure 7, there is shown a partial enlarged perspective view of the mixer 2 of Figure 1 with the door 10 in an open position. In Figure 8, there  
10 is shown a partial side view of the mixer 2 of Figure 1 with the door 10 in an open position. In Figure 9, there is shown a partial enlarged side view of the mixer 2 of Figure 1 with the door 10 in a closed position. The same reference numerals are used in Figures 7, 8 and 9 as those used in Figures 1 and 2 for those components that are identical.

15 In Figure 10, there is shown an enlarged partial perspective view of a further embodiment of a mixer 52 having a mixing chamber 54 with a door 10 in an open position. The mixer 52 is virtually identical to the mixer 2 except that the hydraulic cylinder 12 to open and close the door 10 is connected to two vertical posts 56 extending upward from the tongue 16.

20 In Figure 11, there is shown an enlarged partial perspective view of the mixer 52 with the door 10 in a closed position.

In Figure 12, there is shown an enlarged perspective view of a further embodiment of a mixer 58 having a mixing chamber 60 with vertical side walls 62. The door 10 of the mixer 60 opens and closes in exactly the same  
25 manner as the door 10 of the mixer 52 shown in Figures 10 and 11. An inside view of the door 10 is shown and it can be seen that the door has a segment 62 extending across a bottom thereof.

In Figure 13, there is shown a perspective view of an interior of the door 10 having the segment 62. When the door is in a closed position, the  
30 segment 62 forms part of the floor of the mixing chamber with which the

door is used. Preferably, the segment is substantially flush with the floor of the mixing chamber.

With the door of the present invention, the mixing chamber can be substantially emptied of mixed material by briefly rotating the auger while  
5 the door is open at the end of the mixing process.